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Coronary Aorta Systolic and Diastolic Pressure Indices: Two Novel Indicators for Predicting Significant Coronary Stenosis — A Validation Against Fractional Flow Reserve

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The Effect of Percutaneous Closure of Large Atrial Septal Defects on Right Ventricular Function in Adults


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Background: Percutaneous closure of atrial septal defects has been shown to be a safe alternative to surgery. Despite this, past studies have largely been focused on either small- to medium-sized atrial septal defects or percutaneous closure in children and young adults.

Purpose: Our study sought to examine if right ventricular function and size improved after percutaneous closure of large atrial septal defects in the adult population.

Methods: Over a 5-year span, 25 patients underwent percutaneous closure of a secundum atrial septal defect with an occluder device. A retrospective examination was conducted for each patient, including both echocardiography and chart review for postdevice complications/symptoms.

Results: Average patient age was 44.4 years, and mean device size was 28 mm (range: 24–38 mm). Follow-up echocardiography (mean of 134 days) showed tricuspid annular plane systolic excursion was significantly improved (2.11 vs. 2.33; P=0.013). There was also a significant reduction in right ventricular diastolic chamber size (31.0 vs. 35.4; P<0.01). At 1-year postprocedure follow-up, zero patients had experienced transient ischemic attack, stroke or device perforation/embolization.

Conclusion: Percutaneous closure of large secundum atrial septal defects in adults improves right ventricular function as well as right ventricular chamber size. Percutaneous closure of large atrial septal defects also is a safe, low-risk procedure in terms of future adverse neurologic, embolic or perforation-related events.

Coronary Aorta Systolic and Diastolic Pressure Indices: Two Novel Indicators for Predicting Significant Coronary Stenosis — A Validation Against Fractional Flow Reserve

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Background: Since most of the coronary flow occurs in diastole, either mean PD/Pa or iFR has been used to measure the hemodynamic significance of a coronary stenosis. We have observed that a significant pressure gradient exists in coronary stenosis even in systole, which is contrary to general understanding but similar to ankle brachial index. Furthermore, prior studies have evaluated baseline PD/Pa (mean coronary artery/mean aorta pressure) ratio as well as iFR (instantaneous wave-free ratio obtained during entire period of diastole) to predict fractional flow reserve (FFR) ≤ 0.80. We hypothesized a simple end-systolic and -diastolic pressure measurement in the coronary artery distal to stenosis may perform adequately to predict FFR, obviating a need to measure PD/Pa or iFR.

Purpose: We sought to evaluate systolic and diastolic PD/Pa, and termed them coronary artery systolic pressure index (CASPI) and coronary artery diastolic pressure index (CADPI), respectively, against FFR ≤ 0.80.

Methods: After retrospectively identifying 555 moderate stenotic lesions undergoing FFR measurement at a tertiary care center over a 4-year period, we procured original pressure tracings obtained during the cardiac catheterization and manually measured systolic and diastolic pressures in the aorta and in the coronary artery distal to the stenosis, before and after adenosine infusion. Utilizing FFR ≤ 0.80, operating test characteristics of CASPI and CADPI were measured and compared to those of baseline PD/Pa.

Results: In the 555 lesions, mean CASPI (0.97 ± 0.04) and CADPI (0.95 ± 0.08) were similar to baseline PD/Pa (0.95 ± 0.05). CASPI correlated well with baseline PD/Pa (Spearman r=0.81; P<0.0001). Similarly, CADPI was strongly correlated with baseline PD/Pa (0.86; P<0.0001). The area under the receiver operating curve (AUC) was lower for CASPI and CADPI, as compared to baseline PD/Pa (0.80 vs. 0.82 vs. 0.89, respectively), for predicting the FFR ≤ 0.80. For a CASPI < 0.88 there were no false positives with 100% specificity, and for a CASPI > 1.02, there were no false negatives with 100% sensitivity. Similarly, for a CADPI < 0.8 there were no false positives with 100% specificity, and for CADPI > 1.16 there were no false negatives with 100% sensitivity.
**Conclusion:** These data demonstrate that contrary to the popular belief, significant systolic and diastolic pressure gradients distal to coronary stenosis exist with a reasonable but lower predictive power towards FFR ≤ 0.80.

**Contemporary Usage of Intra-Arterial Catheter-Directed Thrombolytic (CDT) Power Pulse Spray With Rheolytic Thrombectomy in Failed CDT Alone for Acute Limb Ischemia**

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**Background:** Acute lower limb ischemia (ALI) caused by arterial embolism, thrombosis of native vessels, and/or grafts is a serious condition associated with substantial morbidity and mortality. Peripheral arterial thrombolysis utilizing catheter-directed thrombolytic (CDT) has become established as a useful option in the management of ALI. However, use and outcome of adjunctive power pulse spray with rheolytic thrombectomy (PPSRT) following unsuccessful CDT is underreported in the literature.

**Purpose:** To evaluate outcome of contemporary use of intra-arterial CDT PPSRT as an adjunct to unsuccessful standard CDT for ALI.

**Methods:** We reviewed 78 consecutive patients (mean age 69 ± 14.2 years, 48.8% female) who presented to Aurora St. Luke’s Medical Center with less than 14 days of ALI from January 2004 to October 2014. All patients had percutaneous transluminal angioplasty procedures as a standard revascularization option for ALI. Data were collected from electronic medical records, and billing codes. Continuous variables were expressed as mean ± standard deviation and range, and categorical variables as frequency count and percentage. Differences between the groups were analyzed with t-tests or analysis of variance and chi-square or Fisher’s test.

**Results:** 48 patients (Group 1) underwent CDT alone with successful technical and clinical results, while 30 patients (Group 2) who had unsuccessful CDT results underwent adjunctive CDT with PPSRT. There was no statistical significance among both groups in regard to their baseline characteristics. In Group 1 and Group 2, respectively, limb salvage was 87.5% and 86.6% (P=ns), amputation at 30 days 13% and 16% (P=ns), embolectomy 16.67% and 20% (P=ns), emergent bypass graft 8.3% and 13.33% (P=ns), distal embolization 14.89% and 17.24% (P=ns), 30-day compartmental syndrome 12.5% and 13.79% (P=ns), death at 30 days 8.8% and 13.33% (P=ns), and bleeding requiring blood transfusion 16% and 14% (P=ns). Hemorrhagic stroke occurred in one patient of Group 1. Complete and partial anastomosis achieved in (Group 2) 73.4%, length of hospitalization was 10.6 ± 6.25 days (P=ns).

**Conclusion:** Adding intra-arterial CDT power spray with rheolytic thrombectomy to unsuccessful standard CDT as an adjunctive procedure is a powerful revascularization tool for lower extremity acute limb ischemia that achieves success in the vast majority of patients, is not associated with higher complications when compared to successful CDT alone, and obviates the need for emergent surgical revascularization.

**Additional Presentations**

The following citations reflect additional 2015 Aurora Scientific Day presentations, some of which have been published as abstracts or articles in scientific journals.


